Chapter Two

Adirondack Chair

PROJECT PLANNING
Time: 1 day

Special hardware and tools:

1⅝-in. and 1¼-in. "exterior" bugle-head screws with hot-dipped galvanized coating

(10) 1/4-in.-diameter, 2-in.-long galvanized carriage bolts with nuts and washers

4d finishing nails with hot-dipped galvanized coating

Wood:

The wood I used for this chair was 3/4-in.-thick cypress. If you have trouble finding cypress lumber, clear grades of redwood or cedar will also do well outdoors. My cutting list breaks down as follows (nominal dimensions):

(2) 8-ft 1x6s

From one 1x6, cut 2 side members plus the lower-rear crosspiece and the curved rear seat slat. The second 1x6 yields 2 arms and the upper-rear crosspiece.

(2) 10-ft 1x4s

From one 1x4, cut both legs, both brackets, the front crosspiece, and a single short back slat. The second 1x4 yields the remaining 4 back slats.

(1) 10-ft 1x3

Seat slats

It's smart to make and use patterns for a project like this. There are quite a few curved parts, and with a set of patterns you'll have no trouble duplicating your first chair over and over again.

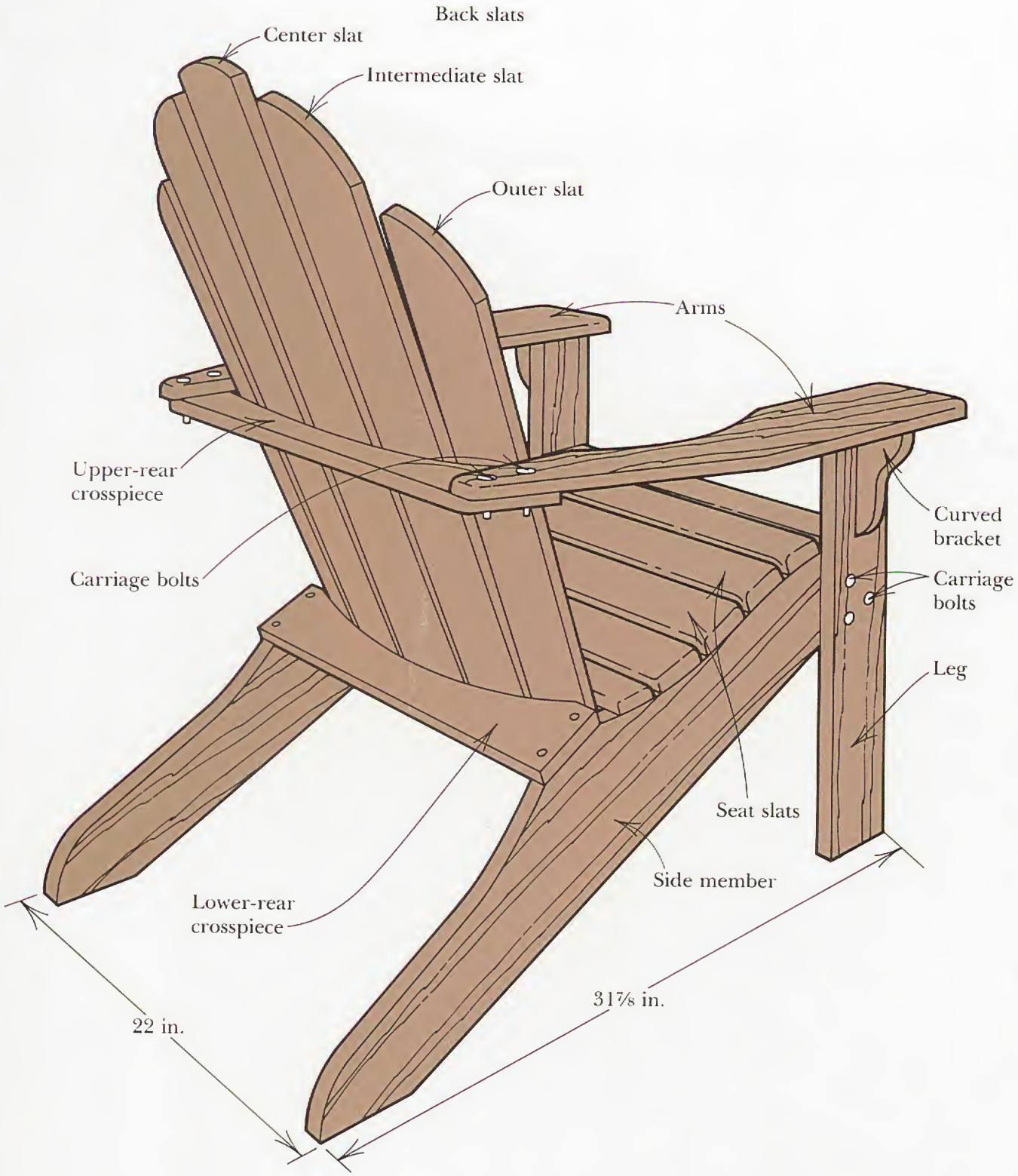
NAMED after the mountains of northern New York, where it first graced the porches of hunting lodges and vacation cabins, the Adirondack chair is a true American classic. Countless versions of this chair exist, including one that my father built over 35 years ago. With peeling paint and a slightly rickety stance, this well-worn object is rich in memories but increasingly poor in structure and comfort. I brought it back to the New Yankee Workshop to help me in designing a new model. I also took time to examine a couple of other Adirondack chairs that are available at furniture stores or through mail-order outlets.

One of the interesting things about these chairs is that they manage to be comfortable, elegant, and exceptionally strong in spite of the most basic joinery details. You won't find any dovetail or mortise-and-tenon joinery here, but there are a few crucial curves and important proportions. In my design, I retained the curved back of the chair but raised the level of the seat slightly. I also kept the arms wide and made them level to hold drinks or even a dinner plate.

Good Wood

Adirondack chairs really belong outdoors — either on the porch or in the yard. It's important for the chair to be designed and built to endure all kinds of weather. Plenty of Adirondack chairs are made from oak and pine, but these woods don't do well outdoors, even with regular coats of paint or preservative. I chose cypress for my chair. Cypress once grew plentifully in swampy or lowland areas in many parts of the country. Today, most new cypress boards come from trees harvested in the southeastern United States. Exceptionally resistant to rot, mildew, and insect infestation, cypress is an ideal outdoor wood. It's also a joy for any carpenter to work with. Seasoned cypress has a tawny color

2-A *Major Anatomy and Dimensions*



and a lively grain with very few knots. The wood is a pleasure to cut, mill, or sand.

The lumber dealer where I buy most of my hardwood didn't have any new cypress in stock, but he was able to locate some old wood salvaged from a brewery. The boards he supplied were nearly a full inch thick, with a waxy coating on one side and a very distinctive smell. I wanted to make my chair from nominal 1x stock, which actually measures 3/4 in. thick. So I used a scraper to remove the wax from the boards, then I ran the stock through my thickness planer. With each pass through the planer, I removed 1/32 in. of wood. When thicknessing stock like this, it's important to plane from both sides of each board. This way, you're sure to expose an even amount of fresh wood, which will help to prevent warping or cupping.

Side Members

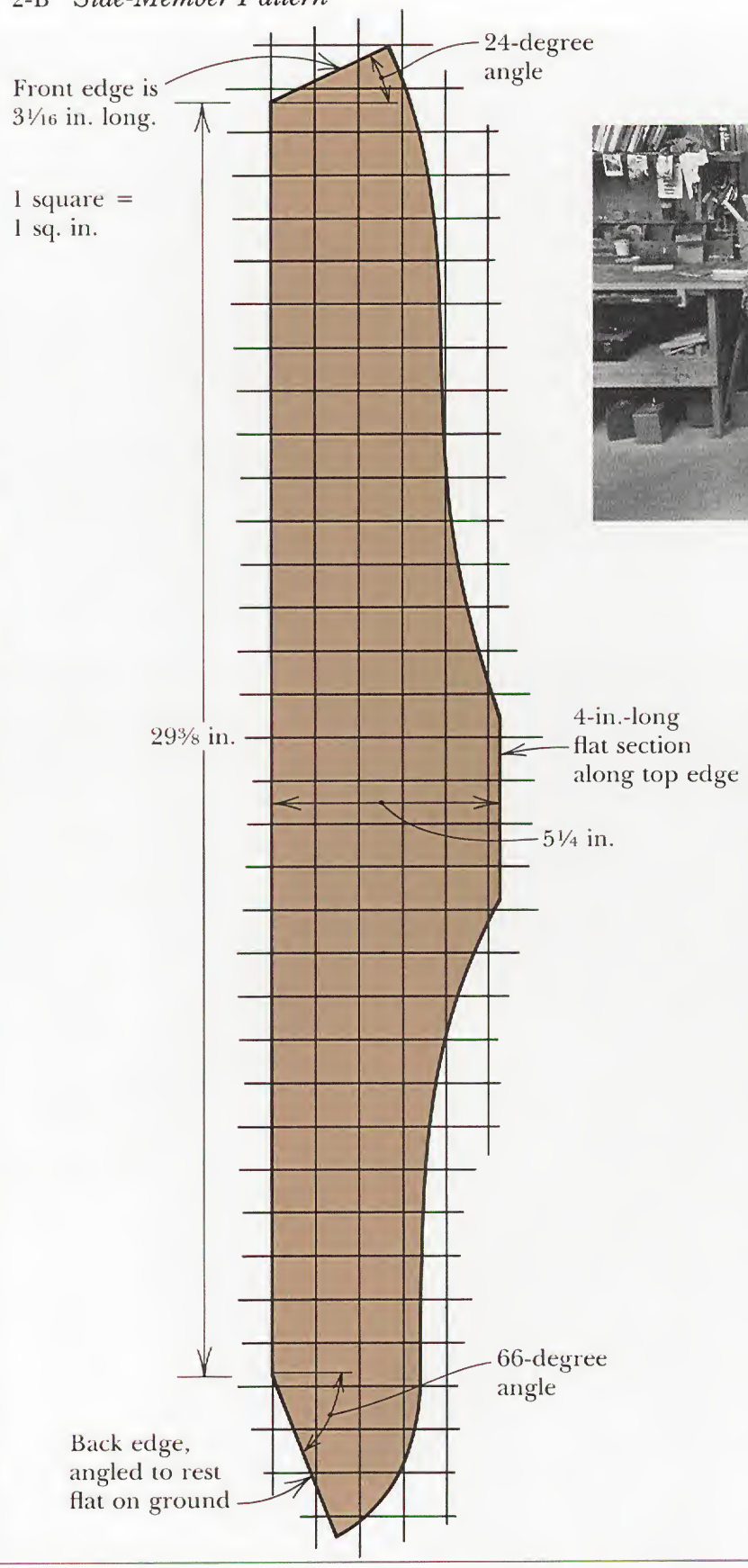
The first parts to cut and assemble are the side members. These 2 pieces are joined to the legs at the front of the chair, hold the seat slats, and extend back to rest on the ground. The top edge of each side member is curved, while the bottom edge is straight, with angle cuts at each end. It's a complex shape, and the best way to ensure uniformity from one chair to the next is to preserve the shape in a pattern. Use drawing 2-B to make a full-size pattern for the side members. A scrap of piece of wood or a section of hardboard makes fine pattern stock.

Use a piece of wood at least 34⅜ in. long and 5¼ in. wide for each side member. After tracing the side-member pattern onto the stock, I cut out both pieces on the band saw (*photo 2-1*). To smooth out the curved edges on both side members, I go over to the drill press and tighten a 2-in.-diameter drum-sanding attachment in the chuck. For this type of smoothing operation, medium-grit sandpaper works well on the drum. Turning on the machine, I sand the curved sections of each piece, exerting just enough pressure against the sanding drum to remove the saw marks (*photo 2-2*).

Once the side members are complete, they can be joined together by attaching the front crosspiece and the lower-rear crosspiece. The front crosspiece is 3½ in. wide and 22 in. long. I clamp a side member in my bench vise, with its front edge facing up. This enables me to hold the front crosspiece in position while predrilling and countersinking the holes for a pair of galvanized 1⅝-in. bugle-head screws (*photo 2-3*). With their rough, rustproof coating and coarse thread pattern, these screws have excellent holding power in wood.

After joining the front crosspiece to the side members, the lower-rear crosspiece can be made and attached. This curved piece is 22 in. long and 3⅞ in. wide at its broadest points. Again,

2-B *Side-Member Pattern*

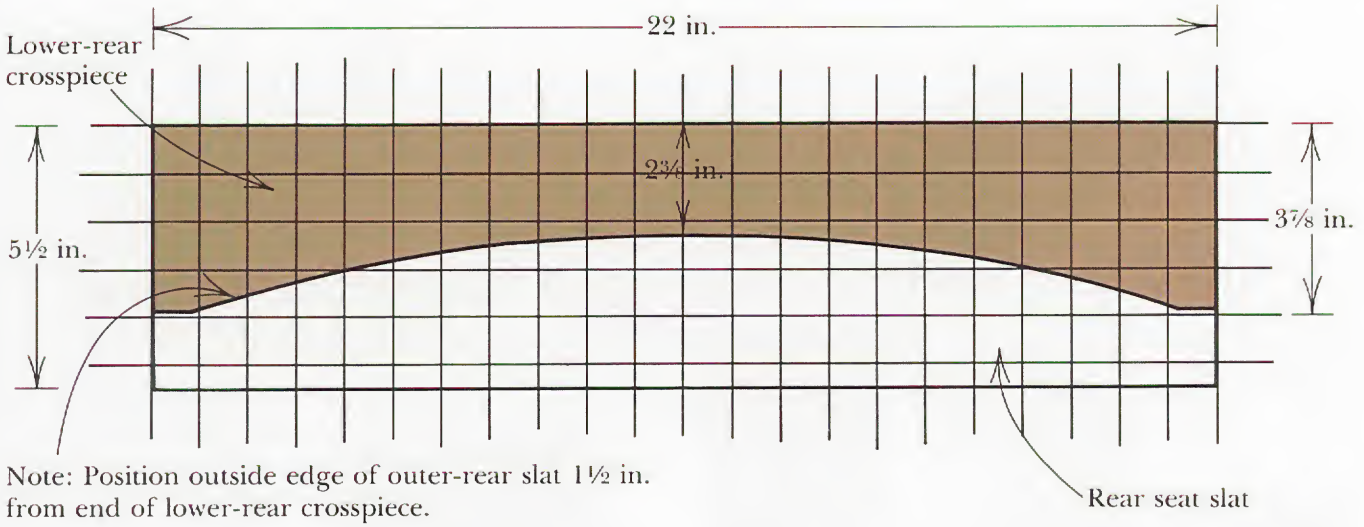


2-1 I use the band saw to cut out each of the chair's 2 side members.

2-2 A sanding drum, chucked in the drill press, makes quick work of smoothing saw marks from curved sections of each piece.

2-C *Lower-Rear Crosspiece Pattern (including rear seat slat)*

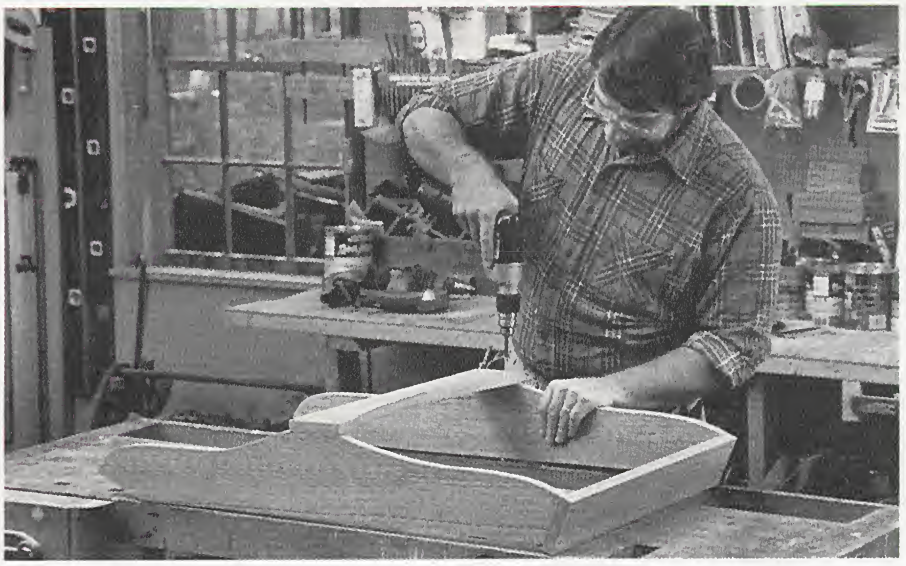
1 square = 1 sq. in.

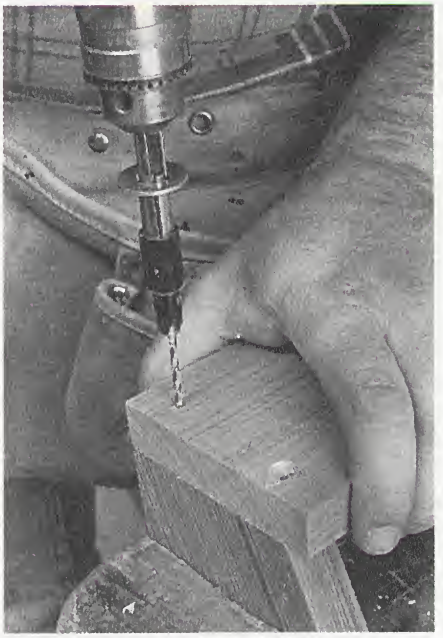


Note: Position outside edge of outer-rear slat 1½ in. from end of lower-rear crosspiece.

I used a pattern to trace the cutting lines onto a length of 1x6 stock (*drawing 2-C*), then I cut the piece out on the band saw. Be sure to save the "waste" side of the 1x6 that remains after the lower-rear crosspiece is cut. This outward-curving board will become the rear seat slat, a perfect match for the curve created by the lower-rear crosspiece.

The wide ends of the lower-rear crosspiece get screwed down on the flat sections along the to edges of the side members (*photo 2-4*). Locate each end of the crosspiece so that its back edge is 19 in. from the upper corner of the side member. I use 2 screws per joint, predrilling and countersinking the screw holes.

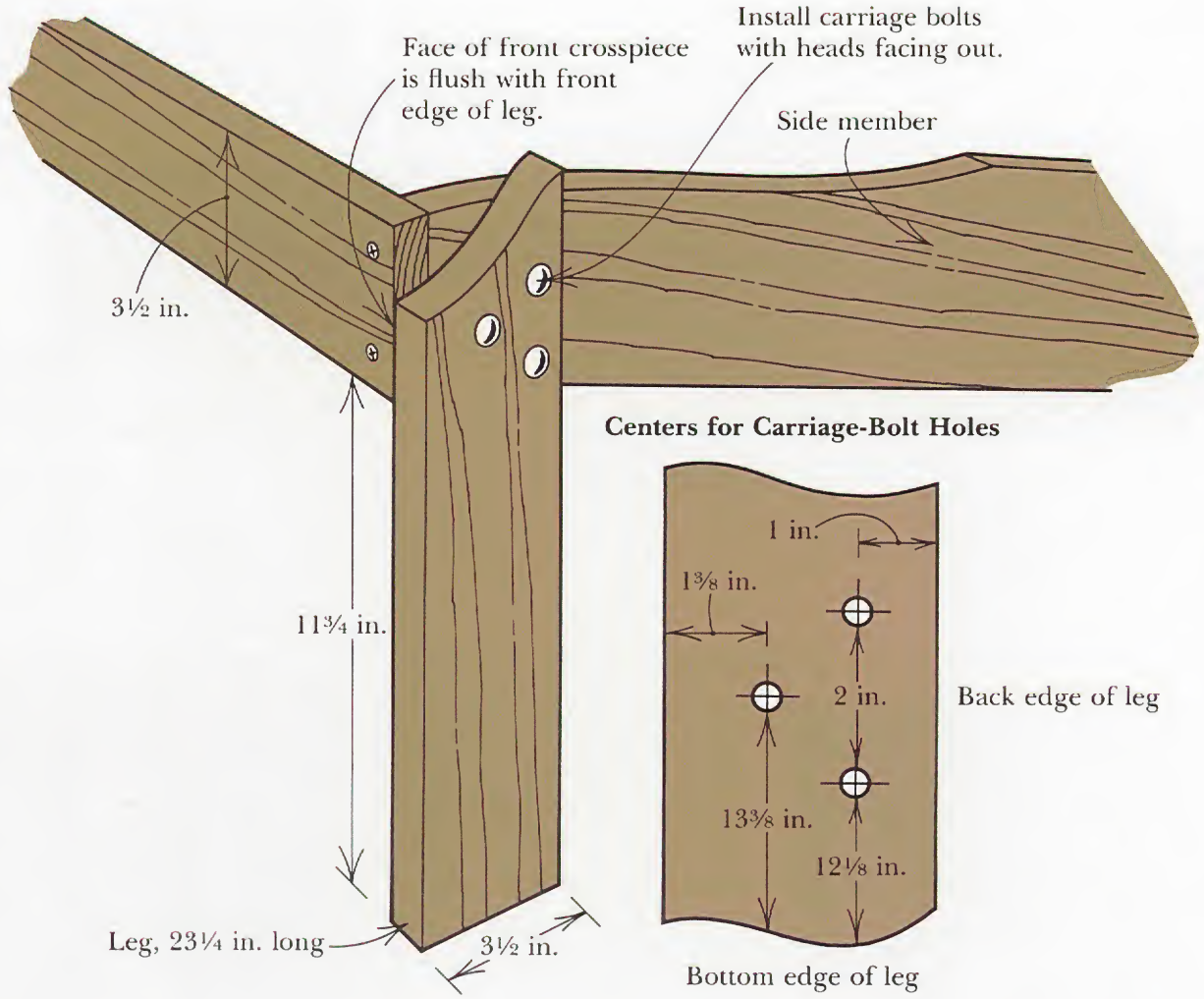




2-3 With the side member clamped in my bench vise, I hold the front crosspiece in place while predrilling and countersinking holes for 1⅝-in. bugle-head screws.

2-4 The broad ends of the lower-rear crosspiece are fastened to the flat sections along the top edges of the side members.

2-D *Leg and Side-Member Joinery*



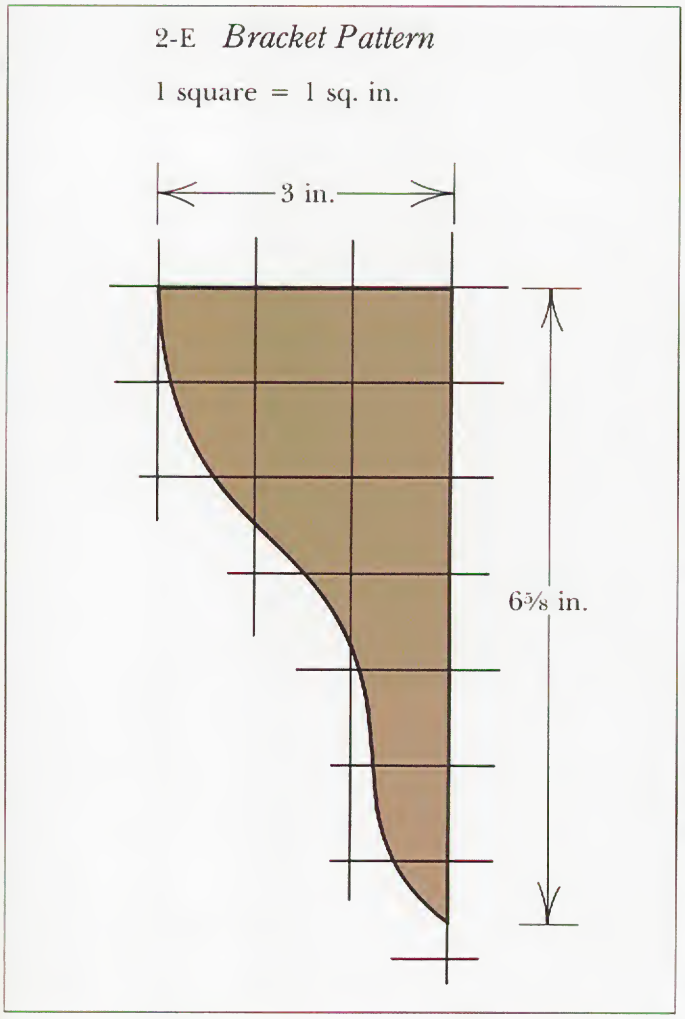
Legs and Arms

The legs for the chair are 23¼ in. long and 3½ in. wide. The connection between each leg and the side member it joins is important for the strength and stability of the chair. I set up the assembly on my workbench, using spring clamps to help position legs against side members. The bottom of the front crosspiece should be 11¾ in. from the bottom of each leg. The front edges of both legs should be flush with the front face of the crosspiece. This should place the ends of the side members squarely on the ground. Drawing 2-D shows crosspiece and leg position.

With the legs and side members clamped in their proper position, I drill holes for 2-in.-long carriage bolts. Just to make sure that these joints stay solid, I use three 1/4-in.-diameter bolts per joint. The smooth, round heads of the bolts show on the outside

of the leg, so I space the bolt holes evenly, as shown in drawing 2-D. When you install carriage bolts, the drill-bit diameter should match the diameter of the bolt, and a washer should always be used between the nut and the wood. As the nut is tightened and the joint pulls together, the short, square shank section just beneath the bolt head seats in the wood, preventing the shank from turning as the bolt is fully tightened (*photo 2-5*).

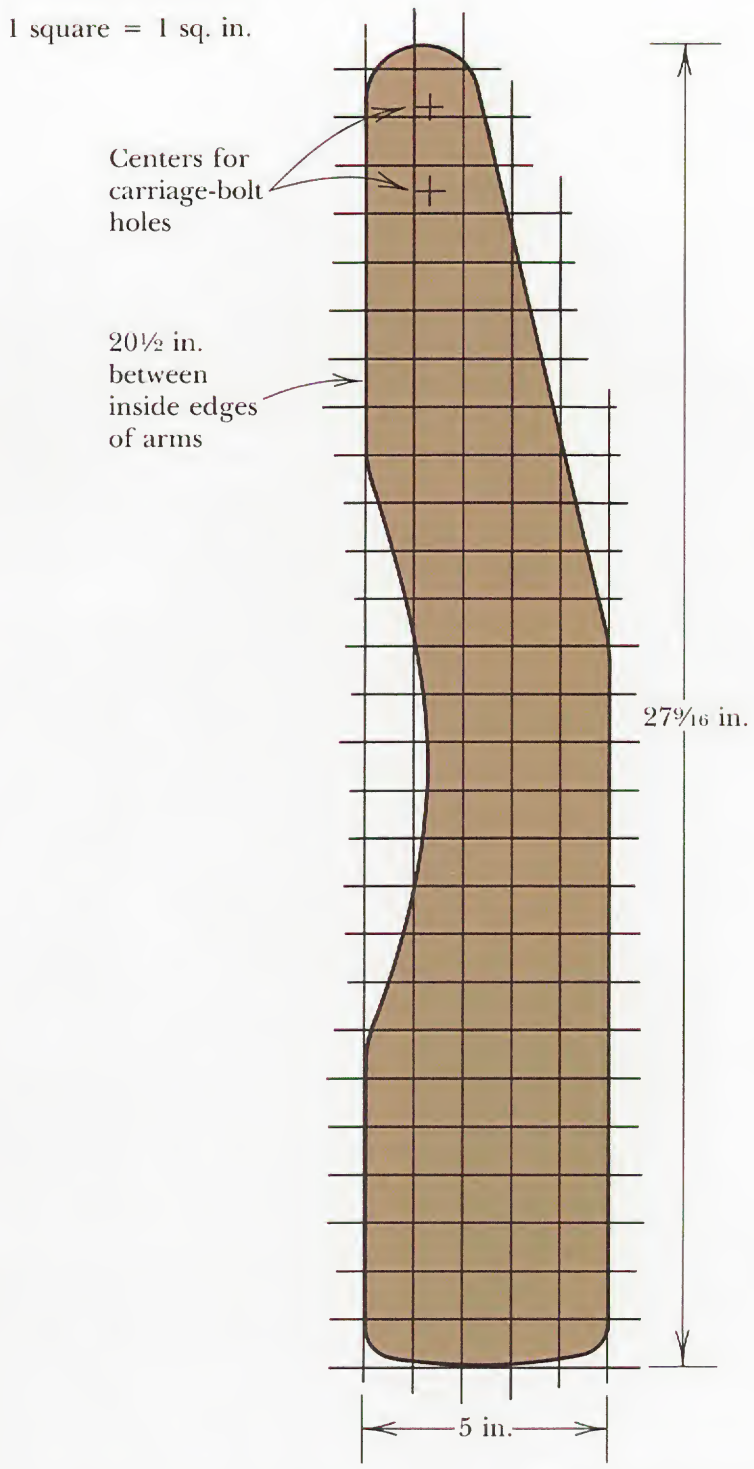
I attach the arm-support brackets next. My brackets are 6⅝ in. long and 3 in. wide, cut in a gentle curve on the band saw. For the bracket pattern, see drawing 2-E. The straight inside edge of each bracket is centered on the outside face of the leg it joins. The top edge of the bracket needs to be flush with the top edge of the leg. Holding the bracket in position against the outside face of the leg, I drive a 1⅝-in. bugle-head screw through the inside face of the leg and into the thick section of the bracket near the top of the leg. Then I drive a 1¼-in. bugle-head screw through the leg and into the thinner lower section of the bracket (*photo 2-6*). Both these screw holes should be predrilled and countersunk.

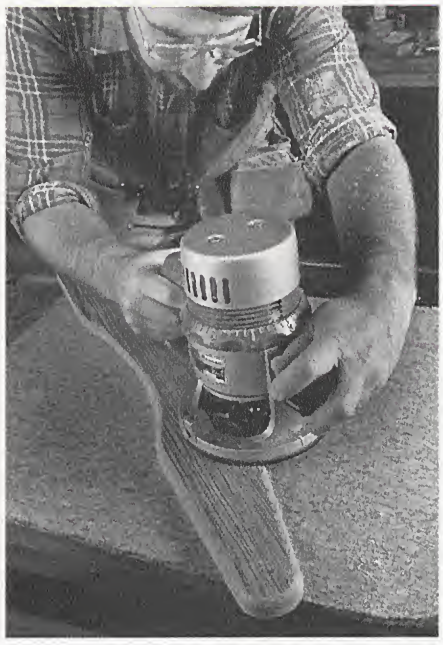


2-5 I use 3 carriage bolts to fasten each leg to its side member. Bolts are installed in 1/4-in. diameter holes, with heads facing out. The square shank section just beneath the bolt head seats in the wood as the nut is tightened with a wrench.

2-6 Each leg gets a small curved bracket attached against its outside face. The top edge of the bracket should be flush with the top edge of the leg. To install the bracket, I drive 2 screws through the inside face of the leg and into the edge of the bracket.

2-F *Arm Pattern*





2-7 After cutting the arms out on the band saw and smoothing them on the drum sander, I round over their top edges with the router and a 3/8-in. roundover bit. The foam pad on the workbench keeps the arm from shifting as I work my way around its edge.

2-8 Arms are fastened to legs and brackets with 3 screws, installed in a triangular pattern.

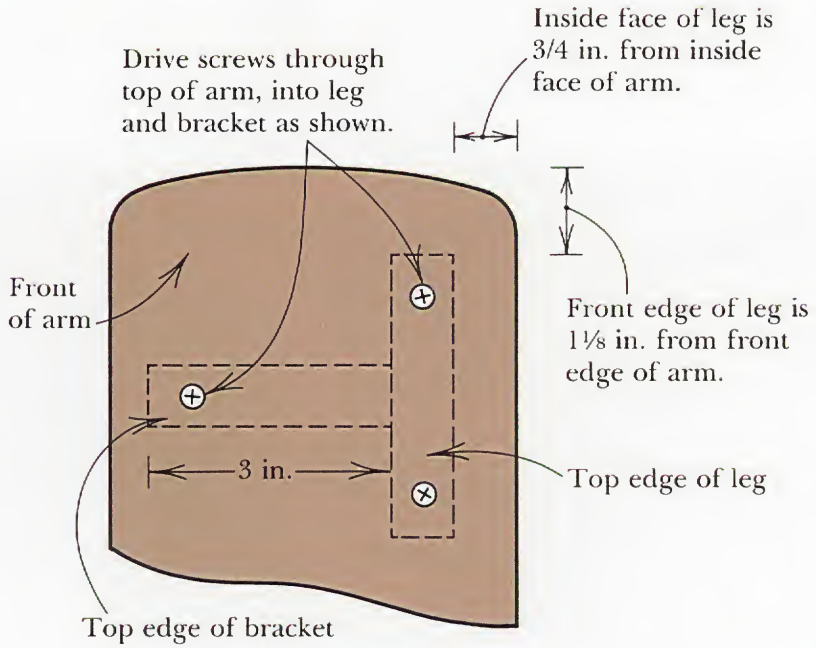
The arms come next. Using a pattern (*drawing 2-F*), I trace the arm shape onto two 1x6 boards, then cut the arms out on the band saw. The sawed edges need to be smoothed, and I do this work on the drill press, using the drum sander with medium-grit sandpaper.

Next, I use a 3/8-in. roundover bit in my router to mill a round top edge on each arm. After milling the first arm, make sure that the correct face of the second arm is facing up — it should be an exact opposite of the first arm. Otherwise, you might round over a pair of right arms, or a pair of lefts. I rout these edges using a special foam pad that holds the stock in place while I work my way around it (*photo 2-7*). When using the router, make sure to rout from left to right as you face the work. This way, you're milling against the rotation of the bit, so cutting action will be safer and smoother.

Finally, while the arms are still "free," I take this opportunity to give them a good sanding with some fine-grit sandpaper. The remaining square edges should be "eased" slightly so that they won't catch on hands or clothes once the chair is in use.

Attaching the arms to the legs and brackets is a little tricky. A slight alignment error at the front end of the arm will be magnified several times near the back of the arm, where the upper-rear crosspiece and slats are attached. Drawing 2-G shows a plan view

2-G *Arm Installation Over Leg and Bracket*



of the clearances for fitting the left (if you are sitting in the chair) arm. The inside edge of the arm should overlap the inside face of the leg by exactly 3/4 in. The front edge of the arm should overlap the front edge of the leg by 1⅛ in. I use 3 screws to fasten each arm to its leg (*photo 2-8*). A triangular screw pattern will provide good holding power, with one screw driven near the outer edge of the bracket and the other 2 driven into the top edge of the leg. Screw holes should be predrilled and countersunk, as usual.

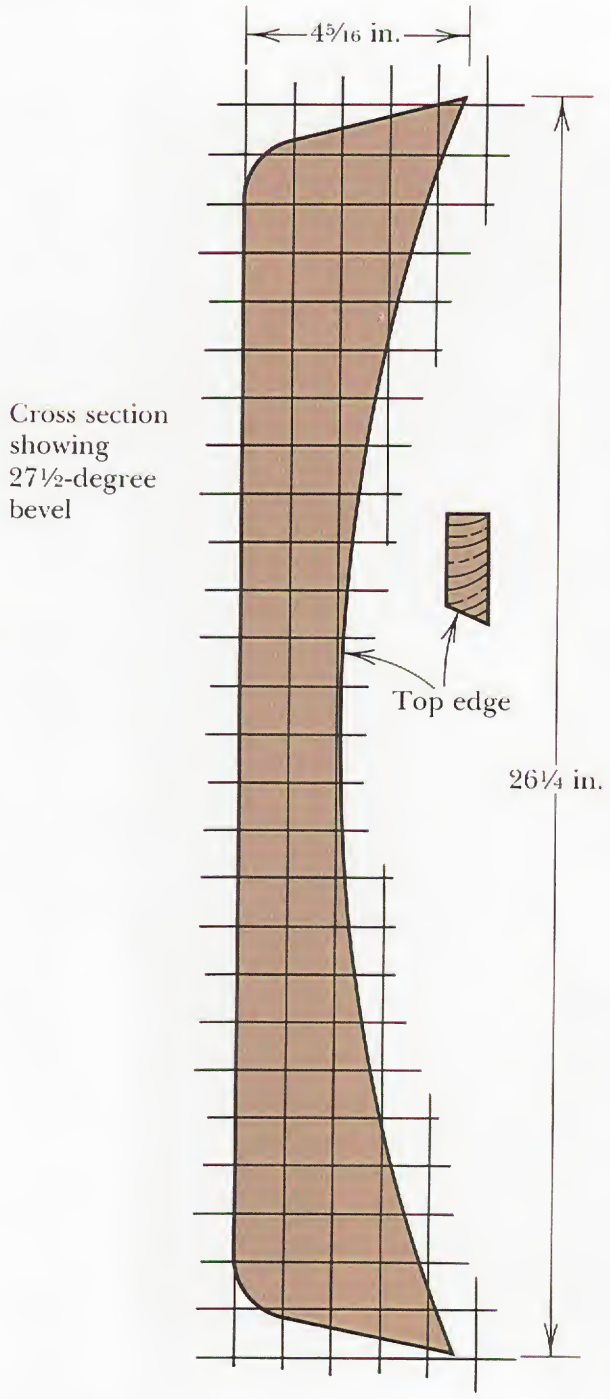
Structural Slats

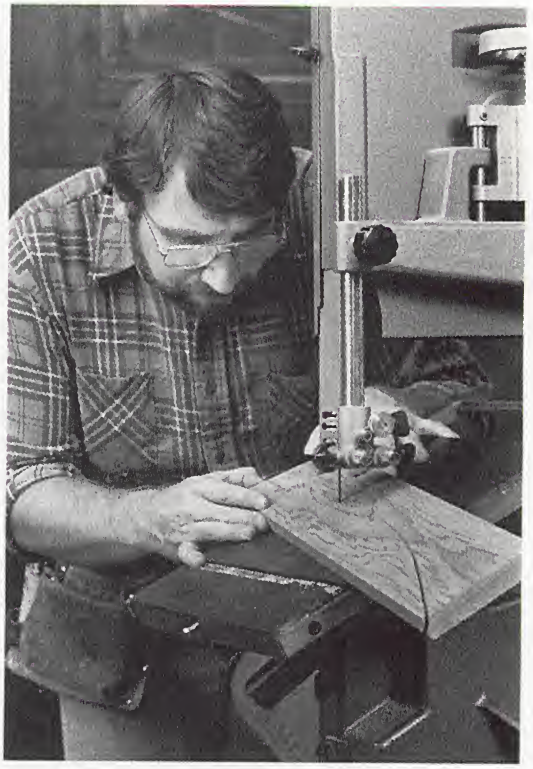
On this chair, the back slats actually help to support the arms. The slats are fastened to the lower-rear crosspiece, which connects the side members, and to the upper-rear crosspiece, which connects the backs of the arms.

Before the back slats can be installed, the upper-rear crosspiece must be cut and attached. This small but crucial member is not only curved but it's also beveled along its "inside" edge, where the back slats will fit. Bevel angle is 27½ degrees (*drawing 2-H*). Using a pattern, I trace the curved shape of the crosspiece onto a length of 1x6 stock. While the band saw is still set up for a 90-degree cut, I cut the 2 curved ends of the crosspiece. Then I tilt the saw table 27½ degrees and carefully cut the curved and bev-

2-H *Upper-Rear Crosspiece Pattern*

1 square = 1 sq. in.





2-9 The upper crosspiece is challenging to cut because one edge is beveled as well as curved. The band saw table is adjusted for a 27½-degree bevel cut.

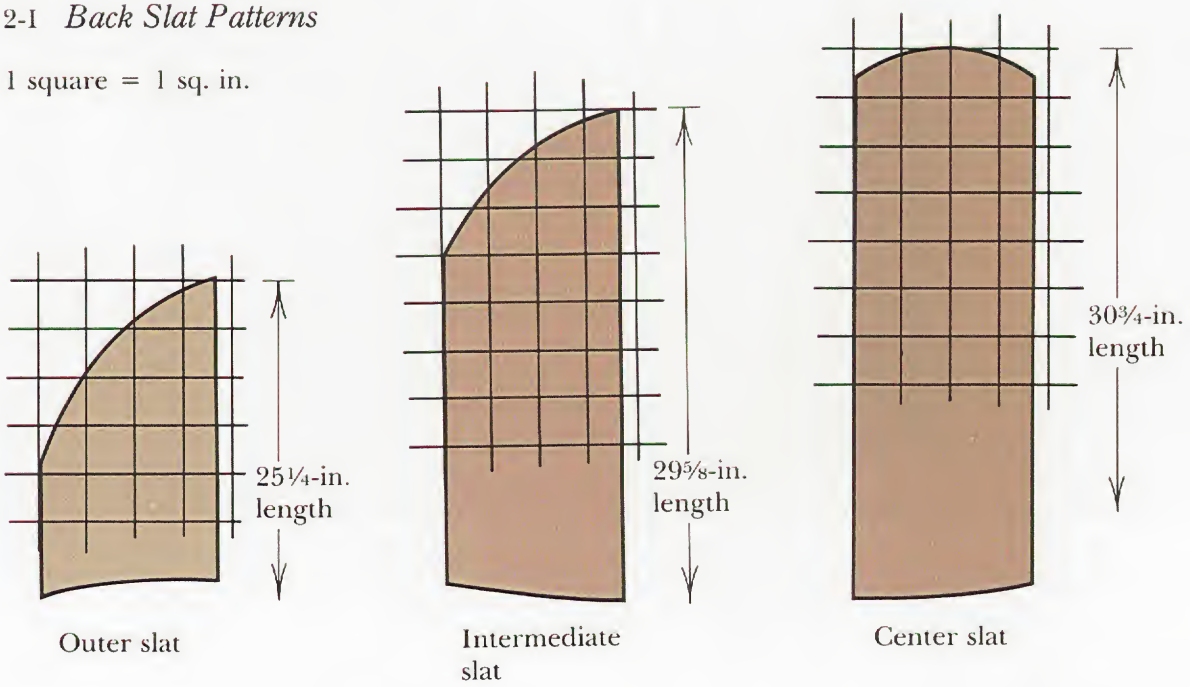
eled edge (*photo 2-9*). It's difficult to cut a curve and bevel at the same time, so don't be upset if the saw blade wanders slightly off the cutting line. You can smooth out these irregularities by using a drum sander fitted with some medium-grit sandpaper.

The upper-rear crosspiece fits underneath the backs of the arms. When fitting the crosspiece, it's important to maintain a 20½-in. distance between the backs of the arms. Given this distance, the back-outside edge of each arm should overlap the outside edge of the crosspiece by about 1/4 in. The wide ends of the crosspiece are curved to follow the curved narrow ends of the arms. This gives me room to use a pair of 1/4-in.-diameter carriage bolts at each connection; both locations are shown in drawing 2-F. Using two bolts per joint ensures that this structurally important part of the chair won't do any shifting, no matter who's sitting down.

Spring clamps do a good job of holding the crosspiece in place under the arms while you drill 1/4-in.-diameter holes for the bolts (*photo 2-10*). As soon as one bolt is installed at each connection, you can remove the clamp and drill the second hole. Install the 2-in.-long bolts with heads facing up. Be sure to use a washer between each nut and the wood.

I cut the back slats from 1x4 stock. There are 5 in all — a center slat 30¾ in. long, a pair of outer slats 25¼ in. long, and a pair of intermediate slats 29⅝ in. long. Curving the slat tops is really a matter of personal taste. The center slat needs a symmetrical curve. The remaining 4 slats should be curved pairs that match on either side of the center slat. The 3 slat curves I use are shown in drawing 2-I.

2-I *Back Slat Patterns*



2-10 Spring clamps secure the upper crosspiece against the backs of the arms while I predrill 1/4-in.-diameter holes for carriage bolts. Each joint gets a pair of bolts, installed with heads facing up.

After cutting the curves on a band saw and sanding the curved edges smooth with the drum sander, I place all 5 slats on the workbench, orienting them as they'll be installed in the chair. This ensures that the rounding-over process will happen along the correct edges of each piece. It's the side and curved edges facing the front of the chair that need rounding over. I use a 1/4-in. roundover bit in my router to mill these edges. Again, I use a special foam pad beneath each slat to hold the slat secure as I work my way around 3 of its edges.

There are several steps to installing the slats. Driving a single screw near the bottom of each slat (and along the slat centerline), I first fasten the slats to the lower-rear crosspiece. Screw holes should be predrilled and countersunk, as usual. Screw the center slat in first, making sure that it is centered on the lower-rear crosspiece. The bottoms of the end slats can be screwed down next. The outer edge of each slat should be located 1½ in. from the outer edge of the lower crosspiece. Last to go in are the inter-

2-11 Back slats are installed with the aid of a 13¾-in.-long measuring stick. Wedged between the back edges of upper and lower crosspieces, the stick keeps these members correctly spaced while I nail the back slats with a pneumatic nail gun.

2-12 The front seat slat should be installed so that it overhangs the front crosspiece by 1/4 in.

mediate slats. I space these 2 slats by eye, centering them in the openings left between center and end slats.

The next step is to fasten the slats to the upper-rear crosspiece. While screws are fine along the bottoms of the slats (they'll be partially hidden by the rear seat slat), I don't like a line of screws showing along the back of the chair. So instead of driving screws through the slats and into the upper-rear crosspiece, I use a pneumatic nail gun and 4d galvanized finishing nails. It's possible to drive these nails by hand, but with a nail gun I can brace the slat with one hand and operate the gun with the other. This saves time, and the nail is driven so quickly that the chair stays put instead of shifting around after each hammer blow.

The 2 outer slats are the first to be fastened to the upper-rear crosspiece. The outer edge of each outer slat should butt against the edge of the arm. Vertical alignment between slats and the upper-rear crosspiece is also important. Without it, this crosspiece might end up lower on one side of the chair than on the other. To make sure this doesn't happen, I hold a 13¾-in.-long measuring stick between the upper-rear crosspiece and the lower-rear

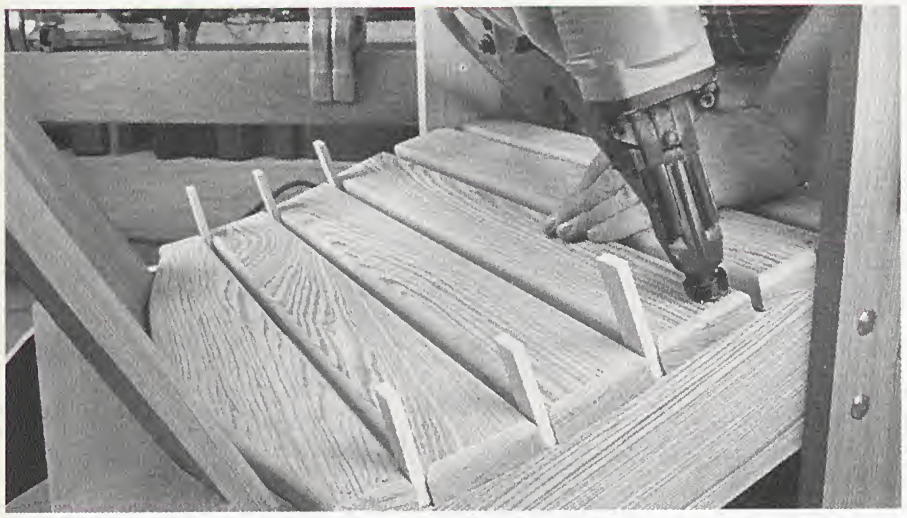
crosspiece when nailing the outer slats (*photo 2-11*). In my design, the ends of the stick should just fit between the outer corners of both crosspieces. Once you've attached the outer slats using this technique, the remaining slats can be fastened to the upper-rear crosspiece without the aid of the measuring stick.

The center slat should be fastened to the center of the upper-rear crosspiece following the installation of the outer slats. The intermediate slats are nailed down last, again positioned by eye so that they're centered in their openings. Finally, as a precaution against cupping, I make sure that each slat/crosspiece connection gets 2 nails. If you're nailing by hand, it's a good idea to predrill the nail holes that flank the screws driven into the lower-rear crosspiece.

The Tail End

At this point, the seat slats are all that stand between me and a comfortable chair. The curved rear seat slat is the "waste" side I saved when cutting out the lower crosspiece. The remaining slats are all 1x3s (which actually measure 2½ in. wide), cut to a length of 22 in. Each slat, including the rear one, should have all 4 of its top edges rounded over. I use my router for this job, with a 1/4-in. roundover bit.

I fasten all the slats to the side members with 4d galvanized finishing nails. The front and rear slats should be installed first. I let the front slat overhang the front crosspiece by 1/4 in., as shown in photo 2-12. To promote good drainage, the rear slat should have about 1/4 in. of space between it and the back slats. Once the front and rear slats are down, the intermediate slats can be positioned across the side members. As an aid in spacing these slats, I place 1/4-in.-thick scraps of wood between slats (*photo 2-13*). A pair of nails at each end should be sufficient to hold each slat.



2-13 After the rear seat slat is installed, remaining slats are positioned using 1/4-in.-thick spacers. Each slat end gets a pair of 4d galvanized finishing nails.